MCP361 Industrial Engineering Lab: Assignment 8

Due date: 9:00 AM October 2, 2024

- **Naming convention for files for this assignment is as follows**
  MCP361_Entry#_Assignment8A.py
  MCP361_Entry#_Assignment8B.py
  MCP361_Entry#_Assignment8_Problem1.txt
  MCP361_Entry#_Assignment8_Problem2.txt
  MCP361_Entry#_Assignment8_Problem3.txt
  MCP361_Entry#_Assignment8.pdf
- **Submit a zip file to Moodle named as follows**
  MCP361_Entry#_Assignment8.zip

Remember the general guidelines for the assignments given at the start of the course.

Consider computing the backward induction strategy for the game trees shown below. You can refer to Section 16.4 of the book "Introduction to Operations Research" 11th edition by Frederick S. Hillier and Gerald J. Lieberman.

[2 marks] You should fix a protocol by which a user can represent the games shown below in a text file and then also fix a protocol whereby your code can read the following games from that text file. **Explain** your protocol in PDF. Stick to the same protocol for each of the game trees shown below.

[5 marks] Now code a python script to compute the backward induction strategies for each game and your code should print how the game will be optimally played as follows:

At node 0 Player 1 chooses to move to node x

At node x Player 2 chooses to move to node y

At node y Player 1 chooses to move to node z

… and so on.

Your code should also print the final information as follows:

The backward induction strategy ends at node Z

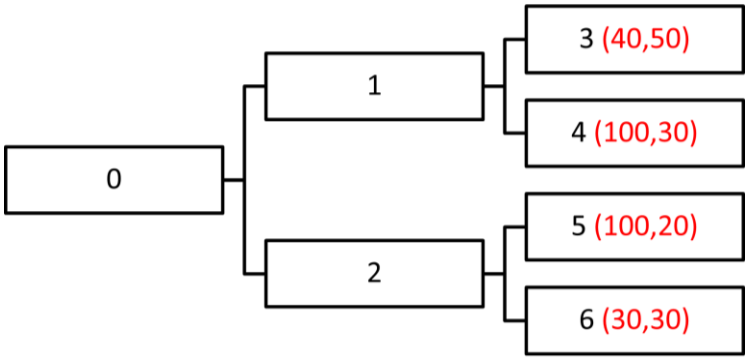
The optimal payoff vector is $[a, b]$

For each question below, **show** the entire code output in the PDF.

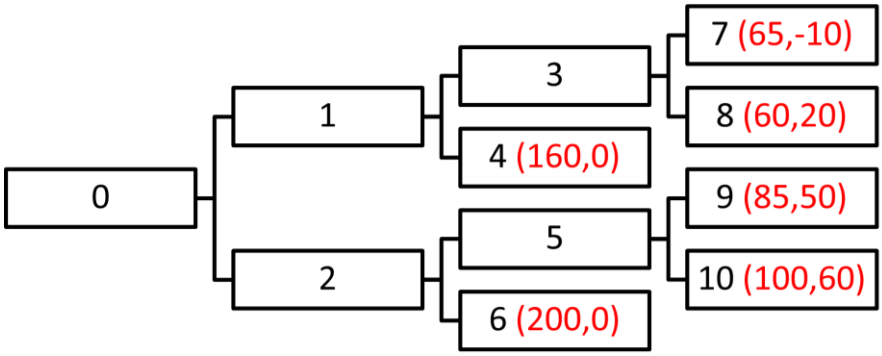
[3 marks] Taking as input the same text file, write a **generic** code to **draw** the game tree with correct node labels *but you only need to show the plot for Q1*. Label each edge with the player who is responsible for

that transition, e.g., label edge $x - y$ with "Player 2." The terminal nodes should also have text attached to it displaying its payoff vector. Use NetworkX, which is a Python library for graphs and networks.

Q1)



Q2)



Q3)